Outer Mirror Assembly

BACKGROUND OF THE INVENTION

The present invention relates to an outer mirror assembly which is attached to the side door of a vehicle and, more particularly, to an outer mirror assembly which has both innovative structure and functionality.

An outer mirror assembly for a vehicle has been known, which has a mirror base extending outwardly from the triangle corner portion of a side window and a mirror housing with a rear view mirror supported by the mirror base. The mirror housing of this outer mirror assembly is supported on the mirror base. In contrast to this, the other type of outer mirror assembly, in which a mirror housing is supported downwardly by a mirror base as shown in FIG.1 is introduced in Japanese Published Patent Application 10-315928 (hereinafter referred to as "document No.1"). More specifically, a mirror housing 2 is supported pivotally by a support portion 1b which extends integrally from a mirror base 1 and overhangs the mirror housing 2. As shown in FIG.2, the outer mirror assembly is mounted onto a vehicle body in such a manner that the mirror base 1 is attached to a triangle corner portion 5 situated at the forward end of a side window 4 of a side door 3.

Japanese Published Utility Application 6-65095 (hereinafter referred to as "document No.2") reports another outer mirror assembly, which has an upper portion 6b of a mirror base 6 and a side portion 8a of a mirror housing 8 cooperatively supporting the mirror housing 8 that houses a rear view mirror 7, as shown in FIG.3.

However, the conventional outer mirror assemblies described above

have not solved problems below.

The outer mirror assembly disclosed in the document No.1, in which a side portion 2a facing a vehicle body completely contacts the inner surface of the mirror base 1, gives an impression that the assembly including the mirror base 1 and mirror housing 2 looks massive. This may have resulted in a limitation of types of vehicle, to which the outer mirror assembly is applied. On the other hand, the outer mirror assembly disclosed in the document No.2, in which the lower portion 6a of the mirror base 6 has a cutout compared with that described in the document No.1, has the side portion 8a of the mirror housing 8 which is completely covered by the mirror base 6. Furthermore, the upper portion 6b of the mirror base 6, which has thicker structure and massive appearance, limits types of vehicle onto which the outer mirror assembly is mounted as well as that described in the document No.1.

In this way, these outer mirror assemblies described above, which have the side portions 2a and 8a that face the vehicle bodies and are covered by the mirror bases 1 and 6, respectively, have not allowed the practical use of these portions.

Wind noise caused by pressure disturbance at the surface of a side window, which is created by hitting of wind stream disturbed by an outer mirror assembly during vehicle traveling, results in noise experienced in a cabin. The outer mirror assembly shown in the document No.1 has a problem that it tends to create much noise resulting from wind noise. The reason for this is that the outer mirror assembly, in which the side portion 2a facing the vehicle body is completely covered by the mirror base 1, does not provide a passage for releasing the wind stream so that the wind stream is susceptible to disturbance by the outer mirror assembly. On the other hand the outer mirror

assembly described in the document No.2 also has the similar problem. Although the mirror assembly which has the lower portion 6a having the cutout can release the wind stream to some extent, the cutout is too small and shallow to provide an efficient passage for the wind stream, thereby resulting in noise in a cabin originating in the wind noise.

The outer mirror assembly disclosed in the document No.1 has tended to have raindrops remain on the side window during a vehicle traveling on a rainy day. This is caused by the raindrops which are not blown off by the wind stream because the mirror assembly which does not have the passage for releasing the wind stream is likely to create an air pocket. The area of side window where the raindrops tend to remain generally falls in an upper area facing the mirror assembly because the wind stream around the mirror assembly forms a diagonally upward stream from forward to backward relative to the vehicle body. These raindrops will block the view of a driver at a river seat when he sees the mirror of mirror assembly. In this way, the mirror assembly has not been able to keep good visibility on a rainy day. On the other hand the outer mirror assembly disclosed in the document No.2, which has small and shallow cutout, has not been able to blow off the raindrops remaining on the side window satisfactorily by the wind stream. Therefore, this mirror assembly has not been able to maintain good visibility on a rainy day, either.

Because a pillar attached to the side end of a front window, which is reinforced thicker for safety in case of a collision, has tended to increase a dead angle zone relative to the side of a vehicle body. The outer mirror assembly disclosed in the document No.1, which has united structure without a cutout from the mirror base 1 to the mirror housing 2, creates a dead angle zone

inevitably. More specifically, if the mirror assembly is attached to the triangle corner portion 5 located at the forward end of the side window 4, the triangle corner portion 5 and the whole mirror assembly cause blocking for the side view, thereby creating the dead angle zone.

In this way, this outer mirror assembly, which creates the large dead angle zone cooperating with the triangle corner portion 5 and the pillar, tends to decrease visibility relative to the side of the vehicle body.

Although the dead angle zone can be decreased if the visibility through the triangle corner portion 5 is sustained by attaching the mirror assembly offset from it upwardly or downwardly, it may result in following new problem.

If the mirror assembly is attached offset upwardly from the triangle corner portion 5, a driver tends to feel uncomfortable because he is forced to shift his line of sight higher than usual while he sees the mirror of the mirror assembly for rear safety. On the other hand, if the mirror assembly is attached offset downwardly, it may not be possible to avoid increase in its size because its supporting element is adapted to be larger inevitably to support the mirror at the same height. Therefore, these modifications described above are considered to be impracticable.

The outer mirror assembly disclosed in the document No.2, which has less effect on the visibility through the triangle corner portion 5 by introducing the cutout, has not solve the problem described above, either.

The present invention provides an outer mirror assembly, which has visual impression of light weight and is applicable to many types of vehicle. The outer mirror assembly also provides the following advantages. It allows flexibility for using the side of a mirror housing, which faces a vehicle body. In addition, it can not only reduce noise in a cabin originating in a wind stream

but also improve visibility on a rainy day. Furthermore, it can reduce a dead angle zone relative to the side of the vehicle body.

As shown in FIG.4, a conventional retractable outer mirror assembly mainly includes a mirror base 210 extending outwardly from the side of a vehicle body, a shaft 240 fixed on the mirror base 210, a mirror housing 230 coupled pivotably to the shaft 240, a mirror 237 disposed in the rear opening of the mirror housing 230. A frame 231 is disposed in the mirror housing 230. An actuator 232 to control the direction of the mirror 237 and a drive unit 233, which positions the mirror housing 230 in a stored or operating position, are attached to the frame 231. The drive unit 233 includes a motor 235 for producing drive power and reduction gear mechanism 234 coupled to the shaft 240. Drive power of the motor 235 is transmitted to the shaft 240 via the reduction gear mechanism 234. The mirror housing 230, which rotates about the shaft 240 while the motor 235 is driven, is retracted or restored to the operating position according to its rotational direction.

Another outer mirror assembly has recently been proposed, onto which a lamp illuminating a step or a door knob, or a winker (a turn signal lamp) is mounted. Japanese Published Utility application 3-52250 and Japanese Published Patent Application 7-228194 disclose the related art described above.

This outer mirror assembly, in which a wire harness for supplying electricity to the lamp is routed through a shaft, can not accommodate all harnesses because their number is limited according to its inner diameter. In this way, addition of wire harness results in not only imposing restrictions on parts to be installed in the mirror housing but also increase in time associated with assembling of the mirror assembly.

These problems described above may be solved by another outer mirror assembly disclosed in Japanese Published Patent Application 8-324342, in which a light unit is attached to a mirror base. This mirror assembly may simplify assembling because it is not necessary to route a wire harness for the lamp to the mirror housing any more.

Because the outer mirror assembly disclosed in Japanese Published Patent Application 8-324342 whose mirror base is placed under the mirror housing, the light unit attached to the mirror base inevitably lies under the mirror housing. Therefore, when it is observed from a position higher than that of the mirror housing, the light unit such as a winker or stop lamp attached to the mirror base may not provide good visibility because the mirror housing acts as an obstacle.

SUMMARY OF THE INVENTION

An outer mirror assembly of the present invention, to which a light unit such as a winker or stop light is attached, provides the following benefits. For example, addition of the light unit does not impose restriction on parts assembled into a mirror housing because it is no more necessary to route a harness through a shaft. In this way, the mirror assembly provides easier assembly and sufficient visibility for the light unit when it is observed by the third person.

An aspect of the present invention provides an outer mirror assembly for a vehicle, which includes a mirror base extending outwardly from a side of a vehicle body, a mirror housing that is suspended from the mirror base so that a space between the vehicle body and the mirror housing can be provided and a rear view mirror is disposed in the mirror housing.

The outer mirror assembly described above has structure (hereinafter referred to as "suspension mounting"), in which the mirror housing is suspended from the mirror base that extends outwardly from the vehicle body. Furthermore, the mirror housing, which is suspended from the mirror base so as to provide the space relative to the vehicle body, has visual impression of light weight so that the mirror assembly can be flexibly applied to many types of vehicle.

Because the mirror housing suspended by the mirror base provides the space relative to the vehicle body, the side portion of mirror housing is not covered by the mirror base but exposed facing the vehicle body. It is thus possible to utilize this side portion.

Furthermore, it is possible to let a wind stream pass smoothly through this space toward backward relative to the direction of vehicle traveling, which decreases disturbance in the wind stream caused by the mirror assembly, resulting in reduction in noise in a cabin.

In addition, it is possible to blow off raindrops falling onto the side window with assistance of the wind stream flowing through the space during vehicle traveling on a rainy day so as to increase the visibility of the mirror. The outer mirror assembly of the present invention has an advantage that the suspension mounting prevents its mirror base from blocking the wind stream which flows along the side window. On the other hand, in a conventional outer mirror assembly which employs a mirror housing supported on a mirror base, the mirror base blocks a wind stream flowing upward diagonally toward the backward of vehicle body. Raindrops tend to remain in an area which blocks the view of a driver when he sees a mirror of the mirror assembly. In this way, the visibility during vehicle traveling on a rainy day tends to deteriorate.

The outer mirror assembly of the present invention introducing the suspension mounting, whose mirror base does not block the wind stream flowing upwardly relative to the vehicle body, provides the smooth wind stream which flows along the side window. A driver at the driver seat can thus look at the mirror clearly because the raindrops on the side window are blown off by the smooth wind stream. In this way, the suspension mounting, which provides the space between the mirror housing and the vehicle body, can increase the visibility of the mirror.

Another aspect of the present invention provides an outer mirror assembly, in which a mirror base includes a mounting plate that is adapted to be attached to a forward end of a side window of a vehicle body.

Introduction of the mounting plate allows mounting of the outer mirror assembly onto the forward end of the side window. It results in not only easier mounting of the mirror assembly onto the vehicle body but also increase in stiffness associated with the attachment of the mirror assembly to the vehicle body.

Still another aspect of the present invention provides an outer mirror assembly, in which a mirror base is attached to one of a pillar of a front window of a vehicle body and a vertical frame partitioning a side window of the vehicle body.

The outer mirror assembly described above, whose mirror base is mounted onto either the pillar disposed at the side end of the front window or the vertical frame of the side window, provides flexibility for mounting location in addition to the forward end of the side window. This allows a benefit of using the triangle corner portion as a window for side view. In this way, the dead angle zone can be decreased and the visibility relative to the side of the

vehicle body can be increased accordingly.

Furthermore, the outer mirror assembly of suspension mounting, which provides a space between the vehicle body and the mirror housing, can provide better visibility through the triangle corner portion. The reason for this is that the mirror base and the mirror housing of suspension mounting, which extend outwardly from the vehicle body, are unlikely to come into the field of view through the triangle corner portion. This makes it feasible for a driver to look at the mirror with the line of sight to which he is accustomed because the mirror housing can be attached in the similar position as that of the conventional one, in the vicinity of the triangle corner portion. Furthermore, it is possible to provide view relative to the side of the vehicle body through the triangle corner portion.

Yet another aspect of the present invention provides an outer mirror assembly, in which a window frame is provided in the forward end of a side window, and a mirror base is attached to an upper portion of the window frame above an opening surrounded by the window frame.

The outer mirror assembly, which introduces the window frame that surrounds the forward end of the side window or a triangle corner portion, allows mounting of the mirror base onto the forward end of the side window, thereby making it possible to use the opening of the window frame as a window for side view. In addition, it is possible to provide side view through the opening because the mirror base rarely overlaps with the opening. Therefore, the present invention provides an advantage that it is possible to reduce the dead angle zone although the mirror base is attached to the forward end of the side window.

A further aspect of the present invention provides an outer mirror assembly for a vehicle, which includes a mirror base extending outwardly from a side of a vehicle body and a mirror housing suspended from the mirror base. The mirror base has a base lens cover which diffuses light irradiated by a light source and the light source is installed in either the mirror base or the vehicle body.

The outer mirror assembly described above, which introduces base lens cover that diffuses the light irradiated by the light source, can improve the visibility of the light. It also allows easier assembly because the light source is disposed in either the mirror base or the vehicle body and it is not necessary to route a wire harness to the mirror housing any more, through which electricity is supplied for the light source.

If a pair of conventional outer mirror assemblies, in which winkers are installed in mirror housings, is attached to a vehicle body on both sides of driver and passenger seats in different setting angles of the mirror housings so as to provide better visibility for a driver, the winkers are inevitably laid out asymmetrically. This results in violation of Japanese law which requires that a pair of winkers shall be symmetrically disposed on both sides of a vehicle body. In contrast to this, the outer mirror assembly of the present invention can satisfy the requirements of the law because the winkers are installed in the mirror bases, which are attached to the vehicle body symmetrically.

A still further aspect of the present invention provides an outer mirror assembly, in which a base lens cover is disposed on at least one of forward and backward sides of a mirror base.

The outer mirror assembly described above, which has the base lens cover installed on either forward or backward surface of the mirror base, light

irradiated by a light source can be better recognized from forward or backward.

A yet further aspect of the present invention provides an outer mirror assembly, in which a bottom wall of a mirror base has a first hole through which a fastener for suspending a mirror housing is inserted. Also in the outer mirror assembly, a base lens cover has an attachment portion which is secured to the bottom wall of the mirror base and the attachment portion has a second hole, through which the fastener is inserted, being aligned with the first hole.

The outer mirror assembly described above allows the attachment of the base lens cover to the mirror base using the fastener prepared for the attachment of the mirror housing to the mirror base. The outer mirror assembly achieves reduction in both number of parts and man-hour cost associated with the assembly work, thereby resulting in reduction in a product cost. Furthermore, the outer mirror assembly allows design flexibility and simpler manufacturing because it does not require an additional boss or mounting hole for attaching the base lens cover to the mirror base.

Another aspect of the present invention provides an outer mirror assembly, in which a mirror base has a first engagement element and a base lens cover has a second engagement element. When the first and second engagement elements are engaged, first and second holes are adapted to be aligned.

The outer mirror assembly described above, which has the first and second engagement elements, can make it easier to attach both the base lens cover and the mirror housing to the mirror base. When the first and second engagement elements are engaged, the base lens cover and the mirror base are temporarily fixed, and the first and second holes are aligned. In this way, the

base lens cover and the mirror housing can be attached to the mirror base only by inserting the fastener into the holes and fastening it.

Still another aspect of the present invention provides an outer mirror assembly, in which a base lens cover is slid from the opposite side of a first engagement element relative to a first hole so that a second engagement element can be engaged with the first engagement element.

The outer mirror assembly described above can increase attachment strength because the engagement of the first and second engagement elements restricts the displacement of base lens cover in a direction of the first engagement element to the first hole.

Yet another aspect of the present invention provides an outer mirror assembly, in which a mirror housing has a housing lens cover which diffuses light irradiated by a light source.

The outer mirror assembly described above, which has the housing lens cover, adds a new function to the mirror housing so as to serve as a winker or a stop lamp without an additional light source because the mirror housing also diffuses the light irradiated by the light source placed in a mirror base or a vehicle body.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is an exploded perspective view showing a conventional outer mirror assembly.

FIG.2 is a perspective view showing an outer mirror assembly shown in FIG.1, which is attached to the side door of a vehicle.

FIG.3 is a front view showing another conventional outer mirror assembly.

FIG.4 is a perspective view showing the other conventional outer mirror assembly.

FIG.5 is a perspective view showing the left side of a vehicle to which an outer mirror assembly according to the present invention is attached.

FIG.6 is an enlarged perspective view of an outer mirror assembly shown in FIG.5.

FIG.7 is an exploded perspective view schematically showing the structure of an outer mirror assembly shown in FIG.5.

FIG.8 is a perspective view showing the left side of a vehicle body to which an outer mirror assembly according to the present invention is attached, as viewed from a driver seat.

FIG.9 is a perspective view showing the left side of a vehicle body to which an outer mirror assembly according to the present invention is attached.

FIG.10 is an enlarged perspective view of an outer mirror assembly shown in FIG.9.

FIG.11 is an exploded perspective view schematically showing the structure of an outer mirror assembly shown in FIG.9.

FIG.12 is a perspective view showing the left side of a vehicle body to which an outer mirror assembly according to the present invention is attached, as viewed from a driver seat.

FIG.13 is a perspective view showing the left side of a vehicle body to which an outer mirror assembly according to the present invention is attached, as viewed from a driver seat.

FIG.14 is a schematic diagram modeling the line of sight of a driver when he sees a side mirror.

FIG.15 is a perspective view showing the left side of a vehicle body to

which an outer mirror assembly according to the present invention is attached, as viewed from a driver seat.

FIG.16 is a perspective view showing the left side of a vehicle body to which an outer mirror assembly according to the present invention is attached, as viewed from a driver seat.

FIG.17 is a perspective view showing an example of modified mirror base.

FIG.18 is a perspective view showing an outer mirror assembly according to the present invention.

FIG.19 is an exploded perspective view showing an outer mirror assembly according to the present invention.

FIG.20A is a front view showing an example for layout of an outer mirror assembly.

FIG.20B is a front view showing the other example for layout of an outer mirror assembly.

FIG.21 is an exploded perspective view showing an example of modified mirror base and base lens cover.

FIG.22 is an exploded perspective view showing the other example of modified mirror base and base lens cover.

FIG.23A is an exploded perspective view showing a mirror base and a base lens cover. FIG.23B is an exploded perspective view showing an example of modified mirror base and base lens cover.

FIG.24A is an exploded perspective view showing the other example of modified mirror base and base lens cover. FIG.24B is a side view of FIG.24A.

FIG.25 is a perspective view showing an outer mirror assembly according to the present invention.

FIG.26 is a perspective view showing an example of modified mirror base.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention are now described with reference to the accompanying drawings. In the following description, a common symbol is used for the same item among the embodiments and description of the item would not be repeated. "Forward and backward", "right and left", and "upward and downward" are intended to mean the directions relative to a vehicle body with an outer mirror assembly attached, as viewed from a driver seat.

a. First Embodiment

As shown in FIGS.5 and 6, an outer mirror assembly includes a mirror base 10 which has a mounting plate 10a and an extension 10b and a mirror housing 20 installed with a mirror 23b. The outer mirror assembly has suspension mounting, in which the mirror housing 20 is suspended from the extension 10b providing a space S relative to a vehicle body VB. In this embodiment, the mounting plate 10a has a triangle shape, which is adapted to be attached to a triangle corner portion C placed at the forward end of a side window SW. The mirror housing 20, which rotates about a substantially vertical axis relative to the mirror base 10 being driven by a drive unit, performs retraction and restoring to an operating position.

The space S provided between the mirror housing 20 and the vehicle body VB serves as a passage for a wind stream during vehicle traveling. A pair of the outer mirror assemblies is attached to right and left triangle corner portions C, respectively.

The outer mirror assembly of the first embodiment has the suspension mounting, in which the mirror housing 20 is suspended from the extension 10b that extends outwardly from the vehicle body VB. Furthermore, the mirror housing 20, which is suspended from the extension 10b providing the space S relative to the vehicle body VB, has visual impression of light weight so that the outer mirror assembly can be flexibly applied to many types of vehicle.

Furthermore, it is possible to let a wind stream pass smoothly through the space S toward backward relative to the vehicle body VB, which decreases the disturbance of wind stream caused by the outer mirror assembly, resulting in reduction in noise experienced in a cabin caused by wind noise.

In addition, it is possible to blow off raindrops falling onto the side window SW with assistance of the wind stream flowing through the space S during vehicle traveling on a rainy day and thereby to increase the visibility of the mirror 23b.

Description is made for each item below. As shown in FIG.7, the mirror base 10 made of synthetic resin has the mounting plate 10a and the extension 10b which is integrally formed with the mounting plate 10a. The mounting plate 10a is adapted to be triangular so that it can be attached to the triangle corner portion C. The mounting plate 10a includes a backward portion 10a1 shown in FIG.6 which has a slope descending forward. As shown in FIG.7, a portion of the mounting plate 10a, which faces the vehicle body VB, has a triangular mounting boss 10a2 having a center hole (not shown), through which wire harness 24c and the like are routed to the vehicle body VB. The extension 10b, which includes a base 11 and a cover 12 that extend outwardly from the mounting plate 10a, is adapted to be of a substantially streamline shape. Assembling of the base 11 and the cover 12 creates a sufficient internal

space so that an antenna 13 used for Global Positioning System (GPS) and the wire harness 24c can be accommodated. The cover 12 is attached to the base 11 with a packing between them by a pair of screws 12a, which makes the extension 10b resistant to water and dust.

As the dotted line shown in FIG.7 indicates, a triangular mounting base Z is provided in the triangle corner portion C, which is used for the attachment of the mounting plate 10a.

The mirror housing 20 includes an integrated subassembly 25 and a lower housing 26. The subassembly 25 has a frame 21, an upper housing 22 attached to the frame 21, a mirror portion 23 and a drive unit 24. The subassembly 25, to which the lower housing 26 is attached from downward as shown in FIG.7, is secured to the upper housing 22, and thereby the housing 20 is assembled. All of the frame 21, the upper housing 22 and the lower housing 26 are made of synthetic resin having high stiffness.

A hole 22a is drilled into the upper surface of the upper housing 22. A flange portion 24b connected to a shaft 24a, about which the mirror housing 20 pivots, faces the hole 22a.

The mirror portion 23 has the mirror 23b that is secured to an actuator 23a for its adjustment. The actuator 23a drives the mirror 23b tiltably in both vertical and horizontal directions.

The drive unit 24, which internally has a drive motor, a reduction gear mechanism and the like, transmits its drive power to the shaft 24a. The wire harness 24c coming from the drive unit 24 and the actuator 23a is routed out to the middle of the flange portion 24b through the shaft 24a.

The lower housing 26, which is attached from downward so as to cover the subassembly 25, is secured to the upper housing 22 with three screws 22c.

The lower housing 26, which has an opening 26a for the mirror 23b, allows the mirror 23b to move tiltably within it while secured to the upper housing 22.

The mirror housing 20 is attached to the base 11 in the following manner: making the flange portion 24b contact the bottom of the base 11 while the wire harness 24c is inserted into a hole 11e drilled into the base 11 of the extension 10b; inserting screws 11g into holes 11f and 24d; and tightening these screws 11g. In this connection, the wire harness 24c, which is routed from the inside of the extension 10b into the inside of a pillar P through a threaded shaft (not shown), is electrically connected to that (not shown) of the vehicle body VB. In this way, retraction or restoring of the mirror housing 20 to the operating position and adjustment of the mirror 23b can be controlled by a control unit (not shown), which is disposed around a driver seat.

Functionally speaking, when a driver operates the control unit for retraction or restoring of the mirror hosing 20 to the operating position, a drive motor (not shown) in the drive unit 24 starts rotation, thereby transmitting drive power to the drive shaft 24a. Accordingly, the mirror housing 20 starts pivoting about the shaft 24 according to the direction of motor rotation. In this way, the mirror housing 20 pivots to the retracted or operating position. Also when the driver operated the control unit for adjusting the mirror, a motor for adjustment (not shown) within the actuator 23a drives the mirror 23b to tilt in vertical and horizontal directions.

The space S shown in FIGS.5 and 6 can be adapted flexibly in size according to the dimensions of the extension 10b and the mirror housing 20, or the relative mounting location between them. More specifically speaking, the space S can be flexibly determined as long as the outermost point of the outer mirror assembly lies within the required vehicle width when the mirror

housing 20 is retracted. In the present embodiment, the distance of the space S is selected to be at least 40 mm between the vehicle body VB and the mirror housing 20 when the mirror housing 20 is restored to the operating position.

The mounting plate 10a of the mirror base 10 is secured to the mounting base Z of the vehicle body VB so that the outer mirror assembly described above is mounted onto the vehicle body VB. Three bolts 10c, which are screwed into holes 10d of the mounting plate 10a via through holes Z1.

The outer mirror assembly described above, which allows access from upward for tightening screws for not only attachment of the lower housing 26 to the subassembly 25 but also that of mirror housing 20 to the extension 10b, can provide an advantage that the workability is improved. Because it is possible to disassemble the lower housing 26 from the subassembly 25 only by unscrewing the three screws 22c, repair can be done at either a repair shop or a gasoline station when damage to the outer mirror assembly necessitates replacement of the lower housing 26.

The easy replacement of the lower housing 26 can also make it feasible to prepare variation of outer mirror assemblies with different materials or colors, so that it is possible to provide options for users to enjoy selection of their favorite one.

FIG.8 is a perspective view showing the left side of a vehicle body to which the outer mirror assembly according to the first embodiment is attached, as viewed from a driver seat. The outer mirror assembly is attached to the mounting base Z and the backward image (not shown) is reflected by the mirror 23b. In front of the side window SW, a side observable area represented by a symbol AR in FIG.8 can be provided. In this way, a driver (not shown) is able to have view for the side of vehicle body through the side observable area

AR even if the triangle corner portion C located at the forward end of the side window SW is blocked by the outer mirror assembly. The outer mirror assembly of the first embodiment can avoid a dead angle zone for the side of a vehicle body, which has been created by a conventional outer mirror assembly in conjunction with a pillar and a triangle corner portion. This results in an increase in the visibility for the side of the vehicle. The backward portion 10a1 of the mounting plate 10a has a slope so that the side observable area AR can be increased.

Also the outer mirror assembly, which has suspension mounting, prevents the extension 10b from blocking the lower portion of the side observable area AR, thereby allowing a driver to have view for the lower and side portion of the vehicle body through the side observable area AR.

Furthermore, it is possible to blow off raindrops falling onto the side window SW with assistance of a wind stream flowing through the space S provided beside the mirror hosing 20 during vehicle traveling on a rainy day, thereby increasing the visibility for the mirror 23b. The outer mirror assembly, which employs suspension mounting, provides an advantage that it does not cause blocking by the extension 10b against the wind stream flowing along the side window SW. On the other hand, a conventional outer mirror assembly, which supports a mirror housing on a mirror base, blocks a wind stream by an extension of the mirror base, which flows upward diagonally from forward to backward relative to a vehicle body. This may probably result in raindrops remaining on the area of a side window, thereby blocking the filed of view of a driver when he sees the mirror of outer mirror assembly.

Compared with the conventional outer mirror assembly described above, that of the first embodiment, which employs suspension mounting, does not

block a wind stream WS by the extension 10b of the mirror base 10, thereby letting the wind stream WS flow smoothly along the side window SW. In this way, the driver can have clear view for the mirror 23b because the raindrops on the side window SW are efficiently blown off. The combination of suspension mounting and space S enables better visibility for the mirror 23b.

b. Second Embodiment

FIG.9 is a perspective view showing the left side of a vehicle to which an outer mirror assembly according to the present invention is attached. FIG.10 is an enlarged perspective view showing the outer mirror assembly shown in FIG.9. FIG.11 is an exploded perspective view showing the outer mirror assembly schematically. An outer mirror assembly according to a second embodiment is different from that of the first embodiment in the following manner. A mirror base 10 including a base 11 and a cover 12 is secured to a pillar P disposed on the side end of a front window W of a vehicle body VB. The mirror base 10 of the second embodiment includes an extension 10b of the first embodiment but does not include a mounting plate 10a or a mounting base Z. In this connection, a pair of the outer mirror assemblies is attached to pillars P of the front window W. A pillar P is intended to mean not only one located on the side end of a front window W but also a window pillar which lies at a forward part of window frame of a side window SW.

The outer mirror assembly of the second embodiment, in which a mirror housing 20 is suspended from the mirror base 10 and a space S is provided between the vehicle body VB and the mirror housing 20, gives visual impression that the outer mirror assembly has lighter weight. This results in less limitation for mounting the outer mirror assembly onto vehicles, thereby

making it feasible to apply it to many types of vehicle.

Furthermore, a triangle corner portion C at the forward end of the side window SW is free from blocking caused by an object because the mirror base 10 is attached to the pillar P. In this way, it is possible to use the triangle corner portion C as a window for rear view. This results in a reduction in dead angle zone and better visibility for the side view of a vehicle.

As shown in FIG.11, the mirror base 10, which includes the base 11 and the cover 12, is adapted to be of a substantially streamline shape. The cover 12 is attached to the base 11 with a packing between them by a pair of screws 12a.

The mirror base 10 is attached to the pillar P so that it extends outwardly from the vehicle body VB in the following steps: inserting a threaded shaft 11b, which is integrally formed with an end plate 11a of the base 11, into a mounting hole P1 drilled into the pillar P, in parallel with inserting a projection 11c of the end plate 11a into a positioning hole P2; and tightening a nut 11d around the threaded shaft 11b. In this connection, it may be possible to select an adhesive alternatively for attaching the mirror base 10 to the pillar P.

The space S shown in FIGS.9 and 10 can be adapted flexibly in size according to the dimensions of the mirror base 10 and the mirror housing 20, or the relative mounting location between them.

FIG.12 is a perspective view showing the left side of a vehicle body to which the outer mirror assembly according to the present invention is attached, as viewed from a driver seat. The mirror base 10 is attached to the pillar P disposed at the side end of the front window W and the backward image (not shown) is reflected by a mirror 23b in the mirror housing 20. It may be

possible to mount the outer mirror assembly onto the vehicle without a triangle corner portion C because the mirror base 10 is attached to the pillar P. This allows using the triangle corner portion C as a window for side view, thereby decreasing much more a dead angle zone relative to the view for the side of the vehicle. This results in an increase in the visibility.

Furthermore, the outer mirror assembly, which provide the space S between the vehicle body VB and the mirror housing 20 in addition to suspension mounting, can create a better field of view because the mirror base 10 is unlikely to block the view of a driver. This makes it feasible to place the mirror housing 20 near the triangle corner portion C which is substantially the same location as that of a conventional mirror housing. In this way, a driver can look at the mirror 23b with his accustomed line of sight. Also the outer mirror assembly can add visibility for the lower part of the vehicle side body through the triangle corner portion C.

In this connection, if the layout of the mirror base 10 and the mirror housing 20 is adapted so that the space S can be increased, it may be possible to provide a larger field of view through the triangle corner portion C. This will gives better visibility for side view.

Furthermore, it may be possible to blow off raindrops falling onto the side window SW with assistance of a wind stream WS shown in FIG.12 flowing through the space S during vehicle traveling on a rainy day, thereby increasing the visibility for the mirror 23b.

c. Third Embodiment

FIG.13 is a perspective view showing the left side of a vehicle to which an outer mirror assembly according to the present invention is attached. An

outer mirror assembly according to a third embodiment is different from those of the first and second embodiments in the following manner. Namely, the outer mirror assembly is given an additional function that is created by utilizing a side portion 20a of a mirror housing 20 facing a vehicle body VB. The side portion 20a is completely exposed facing the vehicle body VB because the outer mirror assembly which employs suspension mounting makes the side portion 20a free from being blocked by a mirror base 10, which is different from a conventional outer mirror assembly. This allows practical use of the side portion 20a. In this connection, the mirror base 10 of the third embodiment is same as that of the second embodiment.

The side portion 20a of the present embodiment has a convex mirror 30, by which a driver can have view for an area directly under and beside the vehicle body VB around a left and forward wheel.

The convex mirror 30 is fitted into a recessed portion 20b formed into the side portion 20a and secured by an adhesive. As shown in FIG.13, the upper portion of the convex mirror 30 is adapted to reflect an image IM of the vehicle body VB around the left and forward wheel. Also its lower portion reflects a curb stone E when a driver H pulls his car to the side of a road as shown in FIG.14. The driver H is able to have view for the area directly under and beside the vehicle body VB around the left and forward wheel using the convex mirror 30.

For example, pulling the vehicle to the side of the road with the convex mirror 30 is conducted in the following steps: first, making the vehicle approach to the curb stone E and decelerate it; making the vehicle approach further to the curb stone E and decelerate more looking at the convex mirror 30; when the convex mirror 30 reflects the curb stone E, returning a steering

wheel a little; when the image IM of the vehicle body VB overlaps the image of the curb stone E, returning further the steering wheel to a position in which the vehicle travels straight and bringing the vehicle come to a stop.

The outer mirror assembly according to the third embodiment, in which the convex mirror 30 is attached to the side portion 20a of the mirror housing 20, allows a driver to have view for the area directly under and beside the vehicle body VB around the left and forward wheel, thereby increasing the visibility relative to the side of the vehicle body VB.

d. Fourth Embodiment

FIG.15 is a perspective view showing the left side of a vehicle to which an outer mirror assembly according to the present invention is attached. In a fourth embodiment, the outer mirror assembly is attached to a vertical frame 40, which partitions a side window SW.

As shown in FIG.15, a mirror base 10 is attached to the vertical frame 40 of the side window SW, and a mirror 23b in a mirror housing 20 reflects an image (not shown) of the backward of a vehicle. It is possible not to use a triangle corner portion C of the side window SW because the mirror base 10 is attached to the vertical frame 40. This allows not only using the triangle corner portion C as a window but also providing view for the side of a vehicle body VB through a space S between the side window SW and the mirror housing 20. In this way, the outer mirror assembly allows a driver to have wide view for the side of the vehicle body VB.

e. Fifth Embodiment

FIG.16 is a perspective view as viewed from a driver seat showing the

left side of a vehicle to which an outer mirror assembly according to the present invention is attached. A fifth embodiment has a frame 50, which surrounds a triangle corner portion C of a side window SW. A mirror base 10 is attached to the frame 50 at an upper portion of an opening 50a surrounded by the frame 50.

The frame 50 is configured to be nearly triangular which surrounds the triangle corner portion C. The opening 50a of the frame 50 serves as a window for providing view for the side of a vehicle body VB. The frame 50 is made of synthetic resin the same as the mirror base 10. A forward portion 50b of the frame 50 is secured to a door frame 42 (or window pillar) of a side door 41 and a lower portion 50c is secured to a forward end portion 43 of the side door 41. In this connection, it may be possible to mold the frame 50 integrally with the mirror base 10. In this case, a mounting base (not shown) for securing the integrated frame 50 to the triangle corner portion C should be prepared in advance at the triangle corner portion C.

The outer mirror assembly described above allows attachment of the mirror base 10 to the triangle corner portion C using the frame 50. The outer mirror assembly can also provide view for the side of the vehicle body VB through the opening 50a because the mirror base 10 which is adapted to be attached to the upper portion of the opening 50a can avoid overlapping with the opening 50a. Although the outer mirror assembly is attached to the triangle corner portion C, it is possible to decrease a dead angle zone so as to increase the visibility for the side of the vehicle body VB.

Although the outer mirror assembly described above is an electrically retractable type, the present invention may be flexibly applied to other types such as manually retractable and fixed ones.

Furthermore, it may be possible to select a mounting plate 10aM1 shown in FIG.17 which has an opening 10e serving as a window for providing view for the side of the vehicle body VB. In this case, an opening Z2, which is adapted to have a size corresponding to that of the opening 10e、 is cut out of a mounting plate ZM1.

The convex mirror 30 described in the third embodiment can be attached to the mirror housing 20 of the fifth embodiment. This introduction of the convex mirror 30 also allows a driver at a driver seat to have view for directly under and left of the vehicle body in the vicinity of a left and forward wheel.

f. Sixth Embodiment

As shown in FIGS.18 and 19 an outer mirror of a sixth embodiment, which is a typical door mirror attached to a side door 41 of a vehicle body VB, includes a mirror base 110 extending outwardly from the side surface of the side door 41 and a mirror housing 130 suspended from the mirror base 110. A mirror 137 for rear view lies in the backward opening of the mirror housing 130, and a light unit 120 is provided in the mirror base 110. The following description is given for a case where the light unit 120 is used as a winker (a turn signal lamp) or a hazard lamp.

The outer mirror assembly of the sixth embodiment is an electrically retractable type and the mirror housing 130 is pivotably attached to a shaft 140 as shown in FIG.19, which is secured to a bottom wall 111b of the mirror base 110.

The mirror base 110 of the sixth embodiment, which is made of synthetic resin, is secured to a mounting base Z provided at the forward end of

the side door 41. The mirror base 110 includes a base 111 having an upper opening and a cover 112 which closes the upper opening. The light unit 120 lies between the base 111 and the cover 112.

The base 111 includes the bottom wall 111b and a side wall 111a projecting upwardly from the periphery of the bottom wall 111b. A projection 111c and a threaded shaft 111d, which has threads on its outer circumferential surface, project from the surface of the side wall 111a, which faces a vehicle body VB. On the other hand, a guide hole 111e and a boss into which a first hole 111f (hereinafter referred to as "a mounting hole 111f") is drilled are provided on the bottom wall 111b. A screw B2 is inserted into the mounting hole 111f, which secures the mirror housing 130 to the mirror base 110 in a suspended configuration. A wire harness 139 is routed through the guide hole 111e, which carries signals and electric power for controlling components housed in the mirror housing 130. It may be possible to adjust the coverage of side wall 111a according to the shape of a base lens cover 121. For example as shown in FIG.21, when the base lens cover 121 is directly attached to the upper surface of the bottom wall 111b, it may be unnecessary to provide the side wall 111a where the base lens cover 121 occupies.

As shown in FIG.19, a claw 112a and a boss with a boss with a boss hole 112b project from the inner surface of the cover 112. When the cover 112 is attached to the base 111, the claw 112a is hooked to the inner surface of the side wall 111a and a screw B3 is screwed into the boss hole 112b.

As shown in FIG.19, the light unit 120 includes the hollow base lens cover 121 and a light source 122 which is housed in the base lens cover 121. The lens cover 121 has an attachment portion 121A, which is secured to the bottom wall 111b.

The base lens cover 121, which diffuses light irradiated by the light source 122, is made of U-shaped transparent or translucent synthetic resin or glass. The base lens cover 121 is installed in a side plane 110a, forward and backward planes of the mirror base 110 (see FGI.17). It is not limited to the shape of the base lens cover 121 as shown in the figures. For example, it may be possible to select a J-shaped base lens cover 121 as shown in FIG.21. It may also be possible to select an L-shaped base lens cover 121, so that it is installed in the side plane 110a and the forward or backward plane of the mirror base 110. It may further be possible to select other types of base lens cover 121, such as a cover which only covers the side plane 110a, or the other separate type of covers for the forward and backward planes, respectively.

The attachment portion 121A of the sixth embodiment, including an attachment plate 124 which bridges the inner surface of the base lens cover 121, is placed on the upper surface of boss projecting from the bottom wall 111b of the mirror base 110. A second hole 124a (hereinafter referred to as "a through hole 124a"), through which a screw B2 is inserted, is drilled into the attachment plate 124. The through hole 124a is aligned with the mounting hole 111f. This arrangement allows attachment of the base lens cover 121 to the base 111 of the mirror base 110 making use of the screw B2, which is provided for the attachment of the mirror housing 130 to the mirror base 110. In this way, it is unnecessary to prepare a dedicated fastener for the attachment of base lens cover 121 to the base 111, resulting in a reduction in the number of parts and man-hours required for assembly, so that it may be possible to decrease a product cost for the outer mirror assembly. In addition, because it is unnecessary to provide additional bosses and mounting holes for the base 111, which are intended for the attachment of the base lens cover 121

to the base 111, the outer mirror assembly can not only increase flexibility for designing but also provide simpler manufacturing. Furthermore, the attachment plate 124, which bridges the inner surface of the U-shaped base lens cover 121, serves as a beam, thereby increasing its stiffness.

The light source 122 includes a light emitting diode or an incandescent lamp. When a driver turns on a turn signal switch (not shown), the light source 122 flashes on and off. A wire harness 123, which supplies electricity and the like to the light source 122, is routed into the vehicle body VB through the hollow threaded shaft 111d and electrically connected to a power source (not shown) and a turn signal switch (not shown).

As shown in FIG.19, the mirror housing 130 is suspended from the mirror base 110 via the shaft 140. The mirror housing 130 includes a lower housing 131 which is made of synthetic resin and has upper and backward openings, and a subassembly 132.

When the subassembly 132 is attached to the lower housing 131, the lower housing 131 is mated with the subassembly 132 from downward and a screw B1 is screwed into a mounting tab 131a. The size and shape of the mirror housing 130 are not limited to those shown in FIG.19 but can be modified according to its design.

As shown in FIG.19, the subassembly 132 includes an upper housing 133, a drive unit 134 and a mirror portion 135, which are all mounted onto a frame 136. The upper housing 133 is made of synthetic resin and attached to the upper opening of the lower housing 131. The drive unit 134 retracts or restores the mirror housing 130 to an operating position. The mirror portion 135 includes a mirror 137 for rear view and an actuator 138 for adjusting the direction of the mirror 137.

The drive unit 134 has a reduction gear mechanism, which is mounted onto the shaft 140, and a motor for supplying drive power. The drive power generated by the motor is transmitted to the shaft 140 via the reduction gear mechanism. When the motor is driven, the mirror housing 130 pivots about the shaft 140. In this way, the mirror housing 130 is retracted or restored to the operating position according to the rotational direction of the motor. The actuator 138 has two motors for tilting the mirror 137 about vertical and horizontal axes, respectively. The direction of the mirror 137 is adjusted by controlling rotational direction of each motor.

The wire harness 139 for supplying electricity to the drive unit 134 and the actuator 138 is routed through the hollow shaft 140. More specifically, the wire harness 139 is routed into the mirror base 110 out of the guide hole 111e of the mirror base 110 via the hollow shaft 140. The wire harness 139 is then routed into the vehicle body VB out of the mirror base 110 via the threaded shaft 111d, finally being electrically connected to a control unit (not shown).

Steps for assembling the outer mirror assembly are described referring to FIG.19.

First, the subassembly 132 is assembled by attaching the drive unit 134 to the frame 136 and subsequently attaching the upper housing 133 as well as the mirror portion 135 to the frame 136. In parallel, the shaft 140 is attached to the drive unit 134 and the wire harness 139 is routed outside via the hollow shaft 140.

Next, after the lower housing 131 is mated with the subassembly 132 from downward, the lower and upper housings 131 and 133 are fastened by the screw B1 to complete the mirror housing 130 while the upper housing 133 is mated with the upper opening of the lower housing 131.

Subsequently, a base 140a of the shaft 140 is rested on the bottom wall 111b after the wire harness 139 is routed through the guide hole 111e. The light unit 120 is then attached to the upper surface of the side wall 111a. After aligning a screw hole 140b, the mounting hole 111f and the through hole 124a drilled into the attachment plate 124, the screw B2 is inserted from above through the aligned holes and screwed into the screw hole 140b. In this way, the base 111 and the light unit 120 are jointed. In this connection, routing of the wire harness 123 can be simplified because it is not necessary to route the wire harness 123 for supplying electricity for the light source 122 through the hollow shaft 140 but just to guide the wire harness 123 into the vehicle body VB via threaded shaft 111d. This also increases flexibility for the wire harness 139 which is routed through the hollow shaft 140. This may relax limitation for the diameter and number of the wire harness 139. In other words, the outer mirror assembly of the sixth embodiment can provide flexibility for the parts housed within the mirror housing 130.

After routing the wire harnesses 123 and 139 out of the threaded shaft 111d, the cover 112 is mated with the base 111 and the screw B3 is screwed into the boss hole 112b. In this way, the base 111 and the cover 112 are jointed.

The wire harnesses 123 and 139, which are routed out of the threaded shaft 111d, are guided into the vehicle body VB through a guide hole S12 drilled into the mounting base Z of the side door 41. The threaded shaft 111d and the projection 111c are inserted into the guide hole S12 and a through hole S13, respectively. Finally, the threaded shaft 111d which reaches this side of the mounting base Z through the guide hole S12 is fastened with a nut N, as shown in FIG.19. This completes mounting of the outer mirror assembly onto

the vehicle body VB.

As shown in FIG.18, the visibility for the light irradiated by the light source 122 is remarkably improved because the mirror base 110 is located above the mirror housing 130. It is possible to recognize the light irradiated by the light source 122 more clearly from the forward or backward of the vehicle body VB because the base lens cover 121 is installed in the forward and backward planes of the mirror base 110 as well as the side plane 110a.

The Japanese Law requires that a pair of winkers shall be mounted onto both sides of a vehicle symmetrically. If a pair of outer mirror assemblies according to the present invention is symmetrically laid out in a right-left direction on a vehicle as shown in FIGS.20A and 20B, it may be possible to satisfy this requirement. The outer mirror assembly has an advantage that it may be possible to select different setting angles for a pair of mirror housings 130 which is attached to both sides of driver and passenger seats as shown in FIG.20B because winkers are disposed in symmetrically attached mirror bases 110. This flexibility for the setting angles allows relaxation in requirements for the range of adjustment driven by the actuator 138. This will result in a smaller envelope required for movement of the actuator 138, thereby increasing design flexibility for the mirror housing 130.

The outer mirror assembly, which has the light unit 120 in the mirror base 110, can serve as a winker or a hazard lamp independent of the position of the mirror housing 130, namely a stored or operating position. For example, even if the mirror housing 130 is retracted while the vehicle is at a stop, the outer mirror assembly can continue serving as a winker or a hazard lamp because the light unit 120 is fixed at the mirror base 110.

It may be possible to select other shapes for the mirror base 110 and the

base lens cover 121 alternatively, not being limited to those shown in FIG.19.

The mirror base 110 shown in FIG.19 has the mounting hole 111f drilled into the boss projecting from the bottom wall 111b of the base 111, for example. As an alternative, it may be possible to select a mounting hole 111fM1 directly drilled into the bottom wall 111b as shown in FIG.21. In this case, an attachment plate 124M1 is laid above the bottom wall 111b. A guide hole 124b is drilled into the attachment plate 124M1, through which the wire harness 139 is routed, corresponding to the guide hole 111e of the base 111. In this connection, the outer mirror assembly shown in FIG.21 has a base plate 141 between the mirror housing 130 and the mirror base 110, which restricts the range of pivoting of the mirror housing 130.

As shown in FIG.22, it may be possible to select a plurality of tabs124M2 projecting from the inner surface of the base lens cover 121 instead of the attachment plate 124, which serves as the attachment portion 121A in the base lens cover 121 as shown in FIG.19. The tabs 124M2 are positioned so that they are aligned with the mounting holes 111fM1. And each tab 124M2 has a through hole 124a.

g. Seventh Embodiment

As shown in FIG.23A, an outer mirror assembly of a seventh embodiment has an engagement mechanism for assembling a mirror base 110 and a base lens cover 121. In the following description, a common symbol is used for the same item as that of the sixth embodiment and description of the item would not be repeated.

The outer mirror assembly has a first engagement element 115 on a base 111 of the mirror base 110 and a second engagement element 126, which

is engaged with the first engagement element 115, on an attachment plate 124. When the first and second engagement elements 115 and 126 are engaged, a mounting hole 111fM1 and a through hole 124a are adapted to be aligned.

The first engagement element 115 includes a T-shaped projection 115a, which projects from a bottom wall 111b of the base 111. On the other hand, the second engagement element 126 includes a cutout 126a, which is adapted to mate with the projection 115a.

The outer mirror assembly described above brings benefit that attachment of the base lens cover 121 and the mirror housing (not shown) to the base 111 can be done more efficiently. The reason for this is explained in the following manner. When the second engagement element 126 is engaged with the first engagement element 115, not only the base lens cover 121 is temporarily fixed with the base 111, but also the mounting hole 111fM1 and the through hole 124a are aligned. In this way, if a screw B2 is inserted into the through hole 124a and fastened while the mirror housing (not shown) is rested on the lower surface of the base 111, it may be possible to securely attach both the lens cover 121 and the mirror housing to the base 111 without effort.

In this connection, it may be possible to select alternative shapes for the first and second engagement elements115 and 126, respectively.

An example is shown in FIG.23B. It may be possible to select a male element 115b formed at the end of a side wall 111a instead of the first engagement element 115, and a female element 126b formed at the end of the base lens cover 121 instead of the second engagement element 126.

As shown in FIG.24A, it may also be possible to lay the second engagement element 126 at this side of the first engagement element 115 and

engage these two elements. The cover for the base 111 is omitted for convenience sake in FIG.24A.

As shown in FIG.24A, the first engagement element 115 includes a pair of projections 115c provided on the bottom wall 111b. Each projection 115c has a recess on its further surface relative to the mounting hole 111fM1. The second engagement element 126 includes a pair of sticks 126c, which is adapted to be engaged with recesses of the projections 115c.

As shown in FIG.24B, the base lens cover 121 is able to pivot about the pair of sticks 126c in a vertical direction because they are adapted to be aligned to each other. When the base lens cover 121 is attached to the base 111, the mounting hole 111fM1 and the through hole 124a can easily be aligned in the following manner. First, the sticks 126c are engaged with the projections 115c while the base lens cover 121 is tilted. And the base lens cover 121 is pivoted downwardly about the sticks 126c.

In this way, if the screw B2 is inserted into the through hole 124a and fastened while the mirror housing (not shown) is rested on the lower surface of the bottom wall 111b, it may be possible to securely attach both the lens cover 121 and the mirror housing to the base 111 without effort. The outer mirror assembly described above, which has the first and second engagement elements 115 and 126, increases attachment strength because it prevents the displacement of the base lens cover 121 in a direction from the first engagement element 115 to the mounting hole 111fM1.

h. Eighth Embodiment

As shown in FIG.25, an outer mirror assembly of an eighth embodiment includes a housing lens cover 125 on an upper housing 132.

Description for a mirror base 110, a light unit 120 and a mirror housing 130 would not be repeated because they are the same as those in the sixth embodiment.

The housing lens cover 125, which is made of transparent or translucent synthetic resin or glass, diffuses light irradiated by a light source 122 housed in a light unit 120. When the mirror housing 130 is in an operating position, the inner end surface of the housing lens cover 125 relative to a vehicle body VB lies close to a side plane 110a of the light unit 120.

The outer mirror assembly of the eighth embodiment allows the mirror housing 130 to serve as a winker without preparing a new light source in the mirror housing 130 because the housing lens cover 125 diffuses light irradiated by the light source 122 housed in the mirror base 110.

When the mirror housing 130 is in the operating position, the light unit 120 and the mirror housing 130 can cooperatively work as a winker or a hazard lamp while a vehicle is at a stop. In addition, when the mirror housing 130 is retracted, the light unit 120 independently serves as a hazard lamp. The outer mirror assembly of the eighth embodiment, which has the light unit 120 at the mirror base 110, can continuously serve as a winker or hazard lamp independent of the position of the mirror housing 130, namely the retracted or operating position.

It is not limited to the outer mirror assembly which serves as a winker or hazard lamp described above, but it may be possible to install a base lens cover only in the backward plane of the mirror base 110 so that the outer mirror assembly can serve as a stop lamp. In addition, if a lens cover is installed into a bottom wall 111b, it may be possible to add a function of lamp

which illuminates around the door knob or step to the outer mirror assembly.

It is noted that it may be possible to use a cover 112 as a base lens cover if it is made of a transparent or translucent material.

It is not limited to the mirror base 110 as shown in FIG.19, which is made of the base 111 and the cover 112. For example, it may be possible to select a mirror base 110M1 as shown in FIG.26, which is made of a base 111M1 that is integrally formed with a mounting plate 115 and a cover 112. In this case, the outer mirror assembly is attached to a vehicle body VB by the attachment of the mounting plate 115 to a mounting base Z of a side door 41.

It is not limited to the outer mirror assembly described above which has the light unit 120 including the base lens cover 121 and the light source 122 at the mirror base 110 as shown in FIGS.18 and 25. For example, it may be possible to select a mirror base 110M1, in which only a base lens cover 121M1 is attached to a base 111M1 and a light source 122M1 is installed at a mounting plate 115. Furthermore, it may be possible to place a light source (not shown) at a mounting base Z.

Although the outer mirror assembles described in the above embodiments are an electrically retractable type, the present invention can be applied to other types such as manually retractable and fixed ones.